INTERNATIONAL TELECOMMUNICATION UNION

ITU-T H.450.10

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(03/2001)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Supplementary services for multimedia

Call offering supplementary services for H.323

ITU-T Recommendation H.450.10

(Formerly CCITT Recommendation)

ITU-T H-SERIES RECOMMENDATIONS

AUDIOVISUAL AND MULTIMEDIA SYSTEMS

CHARACTERISTICS OF VISUAL TELEPHONE SYSTEMS	H.100–H.199
INFRASTRUCTURE OF AUDIOVISUAL SERVICES	
General	H.200–H.219
Transmission multiplexing and synchronization	H.220–H.229
Systems aspects	H.230–H.239
Communication procedures	H.240–H.259
Coding of moving video	H.260–H.279
Related systems aspects	H.280–H.299
SYSTEMS AND TERMINAL EQUIPMENT FOR AUDIOVISUAL SERVICES	H.300–H.399
SUPPLEMENTARY SERVICES FOR MULTIMEDIA	**H.450–H.499**

For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation H.450.10

Call offering supplementary services for H.323

Summary

This Recommendation describes the procedures and the signalling protocol for the Call Offering supplementary service in H.323 (Packet Based Multimedia Communications Systems) networks.

The Call Offer supplementary service (SS-CO) enables a calling user A, encountering a busy destination user B, to "camp-on" to the busy user. This means that the call is indicated to user B and kept in a waiting state until user B reacts to the indication, rather than being released due to the busy condition.

This Recommendation makes use of the "Generic functional protocol for the support of supplementary services in H.323" as defined in ITU-T H.450.1.

The support of ITU-T H.450.6 Call Waiting Supplementary Service for H.323 is required for SS-CO.

This Recommendation requires H.323 version 2 (1998) or later. Version 2 products can be identified by H.225.0 messages containing a **protocolIdentifier** = {itu-t (0) recommendation (0) h (8) 2250 version (0) 2} and H.245 messages containing a **protocolIdentifier** = {itu-t (0) recommendation (0) h (8) 245 version (0) x}, where "x" is 3 or higher.

The procedures and the signalling protocol of this Recommendation are derived from the Call Offering supplementary service specified in ISO/IEC 14841 and ISO/IEC 14843.

Source

ITU-T Recommendation H.450.10 was prepared by ITU-T Study Group 16 (2001-2004) and approved under the WTSA Resolution 1 procedure on 1 March 2001.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

ITU-T Recommendation H.450.10

Call offering supplementary services for H.323

1 Scope

This Recommendation specifies the Call Offer supplementary service (SS-CO), which is applicable to various basic services supported by H.323 multimedia endpoints.

Call Offer (SS-CO) is a supplementary service which, on request from the calling user (or on that user's behalf), enables a call to be offered to a busy called user and to wait for that called user to accept this call.

The service description, the procedures and the signalling protocol of this Recommendation are derived from the Call Offer supplementary service as specified in ISO/IEC 14841 and 14843. The support of ITU-T H.450.6, *Call Waiting Supplementary Service for H.323* is required for SS-CO.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T H.225.0 (2000), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.
- ITU-T H.245 (2000), *Control protocol for multimedia communication*.
- ITU-T H.248 (2000), *Gateway control protocol*.
- ITU-T H.323 (2000), *Packet-based multimedia communications systems*.
- ITU-T H.450.1 (1998), *Generic functional protocol for the support of supplementary services in H.323*.
- ITU-T H.450.2 (1998), *Call transfer supplementary service for H.323*.
- ITU-T H.450.3 (1998), *Call diversion supplementary service for H.323*.
- ITU-T H.450.6 (1999), *Call waiting supplementary service for H.323*.
- ITU-T H.450.11(2001), *Call intrusion supplementary services*.

3 Terms and Definitions

This Recommendation defines the following terms:

3.1 automatic call offer invocation timer: A timer governing the time after which SS-CO is automatically invoked after the calling user has been informed that a call has failed because of busy at the destination. The duration of the timer is an implementation option.

3.2 busy, busy condition: A condition where a destination endpoint engaged in one or more calls cannot accept another incoming call due to resource limitations.

NOTE – In the absence of any supplementary services that might modify the behaviour, the endpoint will, in this situation, send a Release Complete message containing a ReleaseCompleteReason of inConf or a Cause IE with cause value #17, "user busy"; an H.323 endpoint may be busy with one call or may be busy with more than one call depending on implementation.

3.3 **call**: Refer to Recommendation H.323.

3.4 **camp-on**: The indication of an incoming call to a busy called user, giving this user the opportunity to accept or reject the call.

NOTE – Acceptance requires that resources will be freed first.

3.5 **camp-on tone**: A special tone or announcement provided to the calling user A while the call is offered to the busy user B.

3.6 **consultation timer**: A timer governing the time in which the calling user is allowed to request invocation of SS-CO after being informed that a call has failed because of busy at the destination. The duration of the timer is an implementation option.

3.7 **endpoint; gatekeeper; gateway; terminal; user**: See ITU-T H.323. Designations "A" or "B" refer to user A's or user B's side, respectively (see definitions of user A/user B below).

3.8 **free**: A property of a user who can accept an attempt to present a call to that user (i.e. allow the call to reach the alerting or answered state).

3.9 **proxy**: An entity that acts on behalf of an endpoint for the SS-CO procedures. The proxy may or may not be co-located with the gatekeeper.

3.10 **offered call**: A call that is in a waiting condition as a result of invocation of SS-CO against a busy called user.

3.11 **user A**: The calling user, also the served user of SS-CO.

3.12 **user B**: The (busy) called user against whom SS-CO is invoked.

4 Abbreviations and Acronyms

This Recommendation uses the following abbreviations:

APDU Application Protocol Data Unit

ASN.1 Abstract Syntax Notation One

EASE Endpoint A Signalling Entity

EBSE Endpoint B Signalling Entity

GK Gatekeeper

IE Information Element

MGC Media Gateway Controller

NFE Network Facility Extension

SCN Switched Circuit Network

SDL Specification and Description Language

SS-CO Supplementary Service – Call Offering

5 SS-CO Service Description

SS-CO is a supplementary service which, on request from the calling user (or on that user's behalf), enables a call to be offered to a busy called user and to wait for that called user to accept the call, after the necessary resources have become available.

The busy called user is given an indication of the offered call. During the time that the call is offered, the called user may either:

– ignore the offered call; or

– may attempt to make the necessary resources available (e.g. by releasing or placing on hold another call).

After the necessary resources become available at the called user, the call shall be completed as a normal incoming call.

5.1 Normal Procedures

5.1.1 Activation/deactivation/registration/interrogation

SS-CO is permanently activated.

Registration and interrogation are not applicable.

5.1.2 Invocation and operation

There are four different methods of invoking SS-CO. An H.323 endpoint/entity complying to this Recommendation shall offer one or more of these methods as follows:

1) Delayed user invocation: the calling user, on being informed that a call has failed because of busy at the destination, shall be able, within a defined time period (consultation timer) to request invocation of SS-CO. If SS-CO is invoked, a call with the same characteristics as the failed call will be set up on behalf of the calling user.

2) Immediate user invocation: the calling user shall be able to request invocation of SS-CO as part of the initial call set-up.

3) Delayed automatic invocation: the calling endpoint or a proxy acting on behalf of it, having informed the calling user that a call has failed because of busy at the destination, shall automatically invoke SS-CO unless the calling user initiates call clearing within a defined time period (automatic call offer invocation timer). If SS-CO is invoked, a call with the same characteristics as the failed call will be set up on behalf of the calling user.

4) Immediate automatic invocation: the calling endpoint or a proxy acting on behalf of it shall automatically invoke SS-CO whenever the calling user makes a call to a user that is busy, if required by the service profile of the calling user.

NOTE 1 – If method 4 (immediate automatic invocation) is provided to a user, methods 1, 2 and 3 will not be available to that user.

If the calling user is provided with both methods 1 and 3 (delayed user invocation and delayed automatic invocation), the calling user shall be able to request SS-CO during the period of the automatic call offer invocation timer. If, at the time of expiry of the automatic call offer invocation timer, the calling user has not requested SS-CO and has not initiated call clearing, the calling endpoint or a proxy that acts on behalf of the calling endpoint shall automatically invoke SS-CO.

On successful invocation of SS-CO, the called user shall receive an indication of the offered call, and the calling user shall be advised that SS-CO has been invoked. Additional information that would normally accompany an incoming H.323 call indication may optionally be provided to the called user.

During the waiting period, for those basic services for which H.323 requires an in-band tone or announcement to indicate progress of the call, an in-band tone or announcement (camp-on tone) shall be provided to the calling user.

NOTE 2 – The camp-on tone may be provided by the called endpoint or by the calling endpoint. The mechanisms how to control whether the calling user should be given a local camp-on tone or a camp-on tone, provided by the called endpoint, follow the principles of using the Progress Indicator information element for tones and announcements control as described in ITU-T 8.1.7.4/H.323 version 4.

If the called endpoint or a proxy acting on behalf of the called endpoint detects that the necessary resources have become available, it shall continue with normal incoming call indication to the called user.

NOTE 3 – The waiting period for the offered call can be subject to time-out. At time-out, the offered call can be released. Any such procedure is outside the scope of this Recommendation.

SS-CO shall be considered completed when any one of the following occurs:

– the called user starts alerting;

– the called user accepts the call;

– the calling user releases the offered call;

– the called user rejects (releases) the offered call.

If the called user starts alerting, the calling user should receive an appropriate indication.

5.2 Exceptional Procedures

If the calling user requests invocation of SS-CO as part of the initial call request (method 2 – immediate user invocation), and immediate invocation is not provided to the calling user, then the request shall be ignored and the call shall proceed as if the request had not been made.

An SS-CO request may be rejected for other reasons, e.g. when the number of calls already offered to the called user is equal to the maximum allowed for this user, or when the call fails due to network conditions. If the request has been initiated by means of delayed user invocation (method 1), immediate user invocation (method 2) or delayed automatic invocation (method 3), the calling user shall be informed about the unsuccessful outcome of SS-CO.

If SS-CO is requested and the called user is found to be not busy, the call shall be treated as a normal incoming call to the called user.

5.3 Interactions with other supplementary services

5.3.1 Call Transfer (SS-CT)

It shall be possible for user A, after having successfully invoked SS-CO against a busy called user B, to transfer a third user to user B. This shall operate similarly to Call Transfer during the alerting state, except that the call shall continue as an offered call. The transferred user may be notified that the call is in a waiting condition against user B, and also that the waiting condition has ceased if user B subsequently enters an alerting phase.

In case of call transfer without secondary call, the transferred user may initiate SS-CO invocation if the transferred-to user is found to be busy.

5.3.2 Call Forwarding Unconditional (SS-CFU)

SS-CO, if invoked, shall operate on a busy user that has been reached as a result of one or more invocations of SS-CFU, provided neither SS-CFNR nor Call Deflection has taken place.

5.3.3 Call Forwarding Busy (SS-CFB)

If the called user is busy and has SS-CFB active, by default SS-CFB shall take precedence over an SS-CO request. In this case SS-CO shall operate on the final diverted-to user if that user is busy, provided neither SS-CFNR nor Call Deflection has taken place.

Alternatively, on explicit request, SS-CO may operate on the first SS-CFB forwarding user.

An implementation may permit the calling user to make the choice between these two alternatives.

5.3.4 Call Forwarding No Reply (SS-CFNR)/Call Deflection (SS-CD)

SS-CO if invoked, shall not operate on a busy user arrived at as a result of one or more diversions, at least one of which is SS-CFNR or SS-CD. The procedures of SS-CFNR/SS-CD shall apply.

SS-CFNR or SS-CD can apply when alerting a user after completion of SS-CO on that user.

5.3.5 Call Hold

No interaction.

NOTE – The called user may use Call Hold to free resources for accepting the call offered via SS-CO.

5.3.6 Call Park/Call Pickup

A call waiting at a busy user after SS-CO invocation may be subject to Call Pickup.

NOTE – The called user may use Call Park to free resources for accepting the call offered via SS-CO.

5.3.7 Call Waiting (SS-CW)

If SS-CO is invoked for a call SS-CW does not apply.

NOTE – SS-CO reuses functionality provided by SS-CW.

5.3.8 Message Waiting Indication

No interaction.

5.3.9 Name Presentation

No interaction.

5.3.10 Completion of Calls to Busy Subscriber (SS-CCBS)

While a call is being offered, the calling user may be able to invoke SS-CCBS.

SS-CO invoked against the called user shall have priority over any SS-CCBS recalls against that called user, when resources at the called user become available.

5.3.11 Completion of Calls on No Reply (SS-CCNR)

No interaction.

5.3.12 Call Intrusion (SS-CI)

While a call is being offered, the calling user may be able to invoke SS-CI. If SS-CI is accepted, SS-CO shall be cancelled. If the SS-CI request is rejected, SS-CO shall remain in progress.

If both SS-CI immediate invocation and SS-CO immediate invocation are requested at call set up, the action is an implementation option.

NOTE – Possibilities include for example:

– unconditionally accept one service request and ignore or reject the other;

– accept one service request and ignore or reject the other based on certain conditions (e.g. call type, destination endpoint type);

– try one service first and if not successful, the other;

– reject both service requests and proceed with the call as if neither of the services had been requested.

If the served user is provided with SS-CO network invocation (immediate) and the served user requests SS-CI immediate invocation, in the absence of other implementation specific rules the network shall not invoke SS-CO. (For other possible actions see Note above.)

5.3.13 Call Linkage

In case of delayed invocation of SS-CO, the Thread ID of the original call attempt (i.e. the call that failed due to user B busy), if available, shall also be used for the offered call.

6 Messages and information elements

The operations defined in Abstract Syntax Notation One (ASN.1) in clause 11 shall apply.

The APDUs of these operations shall be conveyed within H.450.1 Supplementary Service APDUs included in user-user information elements, as specified in ITU-T H.450.1.

When conveying the invoke APDU of the operations defined in clause 11, the *destinationEntity* data element of the NFE shall contain the value *endpoint*.

When conveying the invoke APDU of the operations defined in clause 11, the Interpretation APDU shall be included with the value *discardAnyUnrecognizedInvokePdu*.

7 Signalling Procedures

7.1 Actions at User A's Endpoint

7.1.1 Normal procedures

NOTE – The following procedures apply regardless of the method of invocation (see 5.1.2).

To invoke SS-CO user A's endpoint shall send a *callOfferRequest* invoke APDU in the Setup message that establishes the call. On receipt of a *callWaiting* invoke APDU in an Alerting or a Progress message, user A's endpoint should indicate successful invocation of SS-CO to the calling user.

SS-CO shall be considered complete as soon as one of the following events occurs:

– a Facility message containing a *remoteUserAlerting* invoke APDU is received;

– an Alerting message without a *callWaiting* invoke APDU is received;

– a Connect message is received;

– the call is released.

Normal basic call procedures shall apply in all these cases.

7.1.2 Exceptional procedures

Not applicable.

NOTE – If user A requested SS-CO and the call fails user A's endpoint should indicate failure of SS-CO to user A.

7.2 Actions at User B's Endpoint

7.2.1 Normal procedures

If on receipt of a Setup message containing a *callOfferRequest* invoke APDU the called user is found to be busy, and if all conditions are met to allow SS-CO on the called user, user B's endpoint shall not send a Release Complete message but shall instead:

– inform the called user that a call is waiting;

– send a *callWaiting* invoke APDU in an Alerting message, including also a Progress indicator information element with Progress description No. 8 "in-band information or appropriate pattern now available" if a camp-on tone is provided by endpoint B;

– enter state CO-Dest-Invoked; and

– wait for the called user's action.

NOTE – The *callWaiting* invoke APDU may also be sent in a Progress message if sending of the Alerting message is not appropriate.

If in state CO-Dest-Invoked the called user becomes free and alerting commences then user B's endpoint may send an Alerting message (without invoke APDU) if no Alerting message was sent earlier, or, if an Alerting message was sent earlier, a Facility message containing a *remoteUserAlerting* invoke APDU, and shall enter state CO-Idle.

If in state CO-Dest-Invoked the called user accepts the waiting call user B's endpoint shall send a Connect message and enter state CO-Idle.

If the called user rejects the waiting call user B's endpoint shall send a Release Complete message with ReleaseCompleteReason "destinationRejection" and enter state CO-Idle.

7.2.2 Exceptional procedures

On receipt of a Setup message containing a *callOfferRequest* invoke APDU, if the called user is not busy the call shall continue according to basic call procedures.

On receipt of a Setup message containing a *callOfferRequest* invoke APDU, if the called user is busy but invocation of SS-CO is not possible the call shall be released in accordance with basic call procedures.

If user B ignores the waiting call the reaction is implementation specific (e.g. the call may be cleared after an internal timeout).

8 Interworking and Interactions

8.1 Interworking with SCN

SS-CO may interwork with corresponding supplementary services as defined by other standards by means of gateway interworking functions.

The specification of detailed gateway interworking procedures for SS-CO is beyond the scope of this Recommendation and may be defined for various SCNs by other Recommendations.

8.2 Protocol interaction between SS-CO and other Supplementary Services

The following subclauses describe protocol interactions of SS-CO with other standardized supplementary services. Further interactions without effects on the protocol may apply, see 5.3.

8.2.1 Call Transfer (SS-CT)

The following protocol interactions shall apply if SS-CT is supported in accordance with ITU-T H.450.2.

If the served user A requests call transfer for two calls and SS-CO has been successfully invoked for the secondary call, the actions of SS-CT for transfer during alerting shall apply. The transferred-to endpoint (being in state CO-Dest-Invoked) may include a *callWaiting* invoke APDU when sending the *callTransferSetup* return result APDU in an Alerting message to the transferred endpoint. The transferred-to endpoint may then also send a *remoteUserAlerting* invoke APDU in a Facility message to the transferred endpoint when the transferred-to user becomes not busy. If no *callWaiting* invoke APDU was sent, then also no *remoteUserAlerting* invoke APDU shall be sent.

If the secondary call does not exist, the transferred endpoint may request SS-CO against a (busy) transferred-to user by including in the Setup message a *callOfferRequest* invoke APDU together with the *callTransferSetup* invoke APDU. The transferred-to endpoint shall then follow the procedures of 7.2.

8.2.2 Call Forwarding Unconditional (SS-CFU)

The following protocol interactions shall apply if SS-CFU is supported in accordance with ITU-T H.450.3.

When executing call diversion (unconditional), the rerouting endpoint shall include a *callOfferRequest* invoke APDU in addition to the *divertingLegInformation2* invoke APDU in the Setup message to the diverted-to endpoint if a *callOfferRequest* invoke APDU was included in the Setup message to the (most recent) diverting endpoint. If a *cfbOverride* invoke APDU was also present in the previous Setup message this APDU shall be included in the new Setup message, too.

8.2.3 Call Forwarding Busy (SS-CFB)

The following protocol interactions shall apply if SS-CFB is supported in accordance with ITU-T H.450.3.

If SS-CO is to be invoked against the first busy user encountered even if this user has activated SS-CFB, the calling endpoint shall include in the Setup message a *cfbOverride* invoke APDU together with the *callOfferRequest* invoke APDU.

When executing call diversion (after busy), the rerouting endpoint shall include a *callOfferRequest* invoke APDU in addition to the *divertingLegInformation2* invoke APDU in the Setup message to the diverted-to endpoint if a *callOfferRequest* invoke APDU was included in the Setup message to the (most recent) diverting endpoint.

If a call including a *callOfferRequest* invoke APDU arrives at a busy user who has activated SS-CFB then SS-CFB shall be invoked, unless a *cfbOverride* invoke APDU is also present in the SETUP message. If *cfbOverride* is also present then SS-CFB shall be overridden and SS-CO shall apply as described in 7.2.

8.2.4 Call Forwarding on No Reply (SS-CFNR)/Call Deflection (SS-CD)

No protocol interaction.

NOTE – This means that the rerouting endpoint does not include a *callOfferRequest* invoke APDU in the new Setup message when executing call diversion (no reply/call deflection). Therefore SS-CO will not apply after SS-CFNR or SS-CD has taken place.

8.2.5 Call Hold

No protocol interaction.

8.2.6 Call Park/Call Pickup

No protocol interaction.

8.2.7 Call Waiting

No protocol interaction.

8.2.8 Message Waiting Indication

No protocol interaction.

8.2.9 Name Presentation

No protocol interaction.

8.2.10 Completion of Calls on Busy Subscriber (SS-CCBS)/on No Reply (SS-CCNR)

No protocol interaction.

8.2.11 Call Intrusion

The following protocol interactions shall apply if SS-CI is supported in accordance with ITU-T H.450.11.

In state CO-Dest-Invoked, on receipt of a *callIntrusionRequest, callIntrusionForcedRelease* or *callIntrusionSilentMonitor* invoke APDU in a Facility message, if SS-CI can be successfully invoked, endpoint B shall enter state CO-Idle; if the SS-CI request fails, endpoint B shall remain in state CO-Dest-Invoked.

8.2.12 Call Linkage

No protocol interaction.

9 Gatekeeper/Proxy Actions

In the case of a gatekeeper-routed model, two modes are possible:

- the gatekeeper passes on all received SS-CO operations for processing at the endpoint (see 9.1); or
- the gatekeeper acts on behalf of endpoint A and/or endpoint B for SS-CO (see 9.2).

NOTE – Besides a gatekeeper, other "transit" entities may act on behalf of an endpoint for SS-CO. A "transit" entity in this sense is referred to as a "proxy" in the following clauses.

9.1 Gatekeeper passes on SS-CO operations to the endpoint

In this mode, a gatekeeper shall pass on SS-CO operations to the endpoint for appropriate endpoint processing.

NOTE – A gatekeeper may modify the contents of SS-CO operations, if required.

9.2 Gatekeeper/proxy acts on behalf of an endpoint

9.2.1 Gatekeeper/proxy acts on behalf of endpoint A

A gatekeeper/proxy (for the gatekeeper-routed model or in case a call is routed through a proxy) may act as the SS-CO control entity on behalf of endpoint A and thus become the source of all SS-CO operations sent to endpoint B and the destination for all SS-CO operations destined for endpoint A. The gatekeeper/proxy shall in this case provide the actions as defined in 7.1.

A stimulus-based protocol may be used between the gatekeeper/proxy and user A's endpoint.

9.2.2 Gatekeeper/proxy acts on behalf of endpoint B

A gatekeeper/proxy (for the gatekeeper-routed model or in case a call is routed through a proxy) acting on behalf of endpoint B may decide to become the destination for all SS-CO operations destined for endpoint B and the source of all SS-CO operations sent to endpoint A. The gatekeeper/proxy shall then perform the actions as defined in 7.2.

For this purpose, the gatekeeper/proxy shall monitor the busy/free status of endpoint B. How this is achieved is outside the scope of this Recommendation.

A stimulus-based protocol may be used between the gatekeeper/proxy and user B's endpoint.

10 Dynamic Description

10.1 Operational Model

Figure 1 shows the functional model for successful SS-CO before, during and after SS-CO invocation.

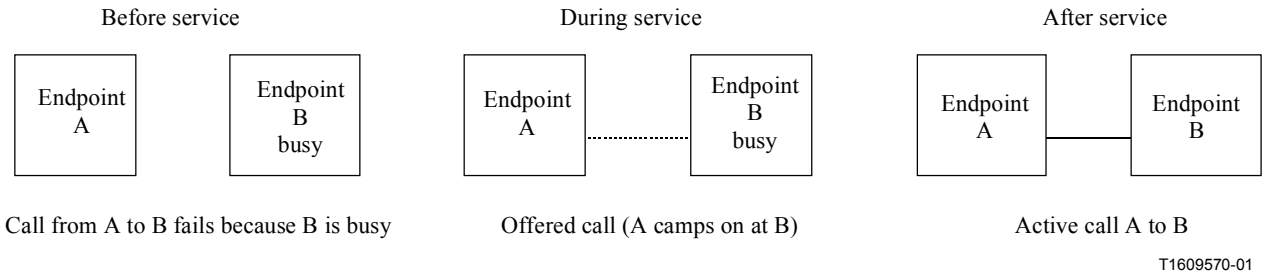
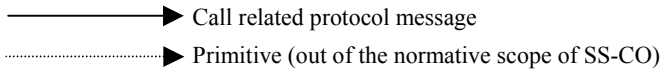


Figure 1/H.450.10 – Operational model for SS-CO

10.2 Signalling Flows

This clause describes some typical message flows for SS-CO. The following conventions are used in the figures of this clause.

The following notation is used:

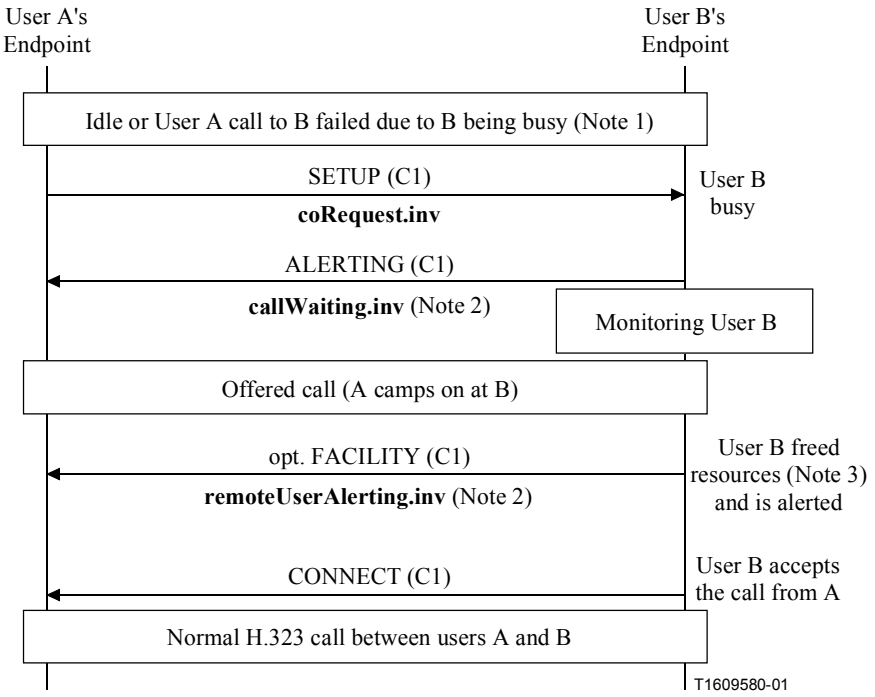


SETUP	H.225.0 message name
Cx	Number of connection x
xxx.inv	Invoke APDU for operation xxx

10.2.1 Successful SS-CO

Figure 2 shows the signalling flow for a successful SS-CO invocation and operation.

NOTE – Figure 2 as shown, is applicable to SS-CO methods 1, 2, 3 and 4 as defined in 5.1.2.



NOTE 1 – RELEASE COMPLETE received with Cause #17 *user busy* or with releaseCompleteReason *inConf*.
NOTE 2 – For SS-CO, callWaiting.inv (as defined in ITU-T H.450.6) may also be sent in a PROGRESS message (e.g. if interworking requires). In such a case, an ALERTING message (without SS-CO APDU) will be sent instead of FACILITY with remoteUserAlerting.inv.
NOTE 3 – E.g. by releasing another call or by putting another call on hold.

Figure 2/H.450.10 – Example message flow for successful SS-CO – direct routed call signalling

10.2.2 SS-CO invocation – unsuccessful

Figure 3 shows the signalling flow for an unsuccessful SS-CO request. In this example, the SS-CO request is rejected by the terminating endpoint (i.e. the call is cleared) even though the called user is busy.

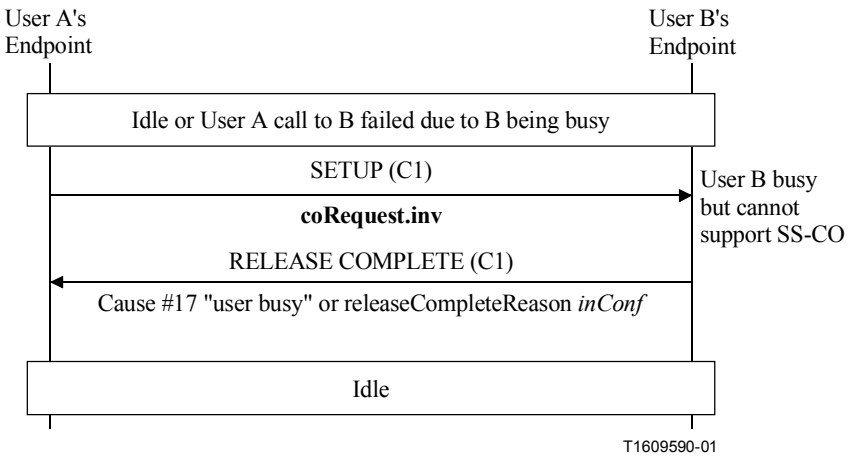


Figure 3/H.450.10 – Example message flow for unsuccessful SS-CO request – direct routed signalling

10.2.3 SS-CO invocation with user B not being busy

Figure 4 shows the signalling flow for an SS-CO invocation with user B being not busy. The call continues as normal call.

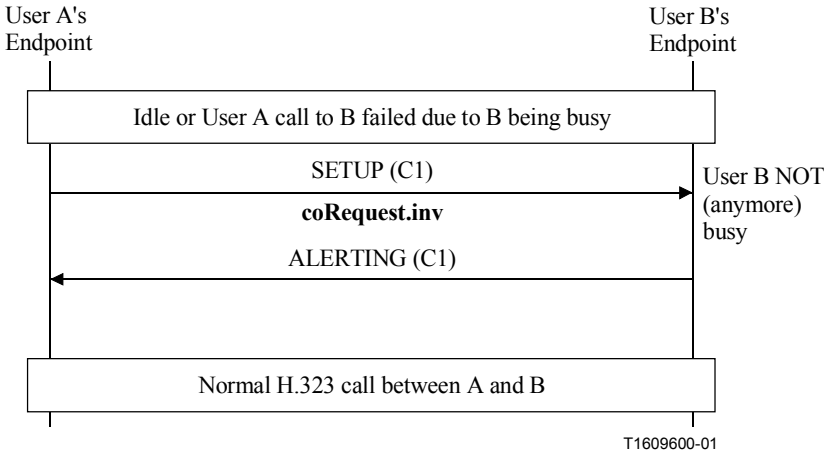


Figure 4/H.450.10 – Example message flow for SS-CO request if user B is not busy – direct routed signalling

10.2.4 Successful SS-CO with GK being transparent for SS-CO signalling

Figure 5 shows the signalling flow for a successful SS-CO invocation and operation in case of gatekeeper routed signalling. In this example the gatekeeper is transparent for SS-CO signalling.

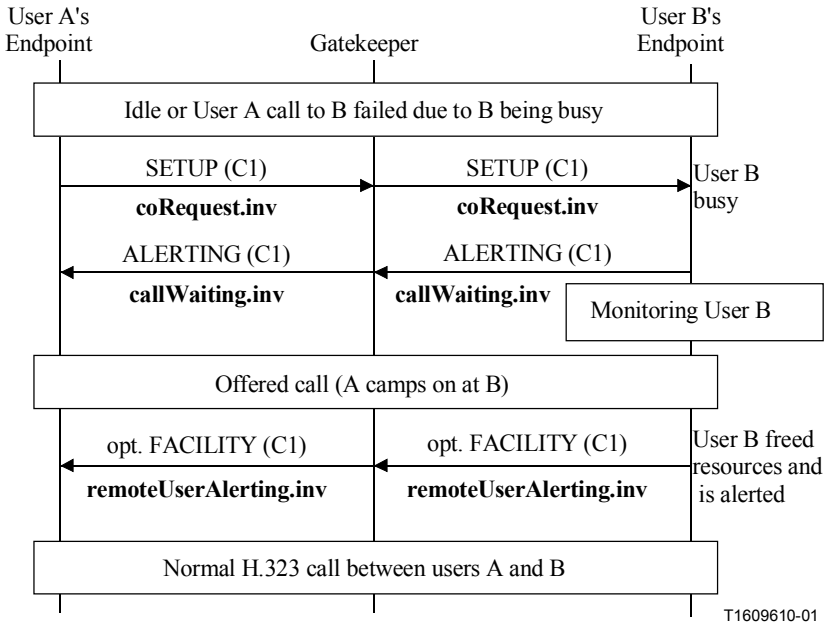


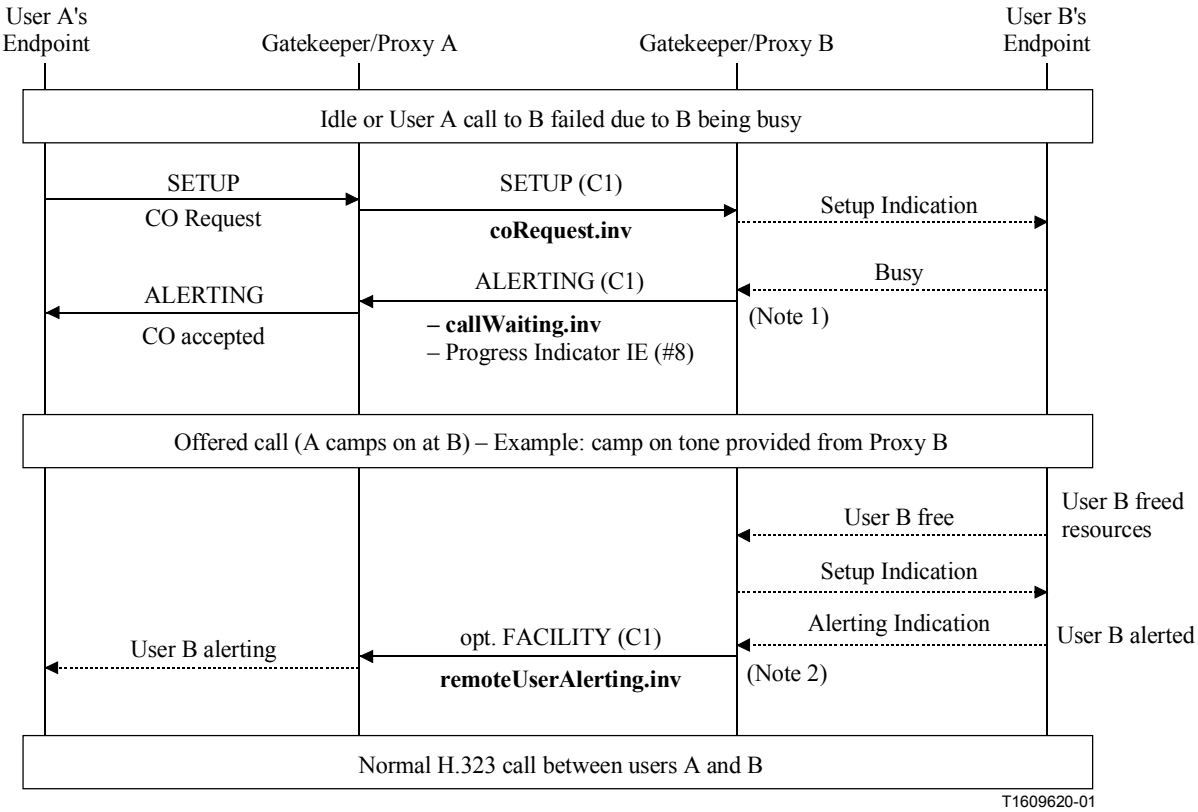
Figure 5/H.450.10 – Example message flow for successful SS-CO – gatekeeper being transparent for SS-CO signalling

10.2.5 Successful SS-CO with GK acting on SS-CO

Figure 6 shows the signalling flow for a successful SS-CO invocation with terminal endpoints A and B not being capable of SS-CO according to H.450.10 (e.g. H.323 terminals with stimulus feature control). In this example, a gatekeeper A or a proxy A acts on behalf of endpoint A for SS-CO. A gatekeeper B or a proxy B acts on behalf of endpoint B for SS-CO.

As an alternative, endpoints A and B may be Annex G/H.248 terminals. In this case, an MGC that terminates H.248 and interworks to H.323 is required within the network (e.g. co-located with the proxy).

The terminal interfaces at endpoints A and B as shown illustrate examples only. These interfaces are out of the normative scope of this Recommendation. Only the interface between gatekeeper/proxy A and gatekeeper/proxy B is part of the normative scope of this Recommendation.



NOTE 1 – The GK/Proxy B acts on behalf of endpoint B for SS-CO upon busy detection. How the GK/proxy B detects that User B is busy depends on implementation and on the terminal protocol.

NOTE 2 – "Third party initiated pause and re-routing" procedures according to 8.4.6/H.323 may be used to close logical channels between endpoint A and GK/Proxy B (assuming that the camp-on tone is provided from Proxy B in this example) and to open new logical channels between endpoints A and B.

Figure 6/H.450.10 – Example message flow for successful SS-CO – gatekeeper acts on behalf of the endpoint for SS-CO

10.3 Communication between an endpoint A signalling entity (EASE) and its Signalling entity user (informative)

If a gatekeeper/proxy acts on behalf of an endpoint, the gatekeeper/proxy is considered as being the Signalling entity and the endpoint served by the gatekeeper/proxy as the Signalling entity user. In this case the local primitive procedures are to be replaced, e.g. by appropriate stimulus feature signalling procedures.

10.3.1 Table of primitives

Table 1/H.450.10 – Primitives at the Served endpoint

Generic name	Type			
	Request (req)	**Indication (ind)**	**Response (resp)**	**Confirm (conf)**
callOfferRequest	– (Note 1)	Not defined (Note 2)	Not defined	Not defined
callWaiting	Not defined	PARAMETERS	Not defined	Not defined
remoteUserAlerting	Not defined	–	Not defined	Not defined
cfbOverride	–	Not defined	Not defined	Not defined
NOTE 1 – "–" means no parameters (manufacturer specific parameters may be present). NOTE 2 – "Not defined" means that this primitive is not defined.				

10.3.2 Primitive definition

The callOfferRequest.Request primitive is used to request the sending of a **callOfferRequest** invoke APDU to the called user B.

The callWaiting.Indication primitive is used to indicate to the served user that a request for SS-CO was accepted and the call is waiting at busy user B.

The remoteUserAlerting.Indication primitive is used to indicate to the served user that alerting of user B has started after the call has been waiting.

The cfbOverride.Request primitive is used to request the sending of a **cfbOverride** invoke APDU to the called user B, together with a **callOfferRequest**.

10.3.3 Parameter Definition

callWaiting.Indication parameters:

Refer to 10.4.3 Parameter Definition for primitives at the called endpoint.

10.4 Communication between an endpoint B signalling entity (EBSE) and its signalling entity user (informative)

If a gatekeeper/proxy acts on behalf of an endpoint, the gatekeeper/proxy is considered as being the Signalling entity and the endpoint served by the gatekeeper/proxy as the Signalling entity user. In this case the local primitive procedures are to be replaced, e.g. by appropriate stimulus feature signalling procedures.

10.4.1 Table of primitives

Table 2/H.450.10 – Primitives at the Called endpoint

Generic name	Type			
	Request (req)	**Indication (ind)**	**Response (resp)**	**Confirm (conf)**
callOfferRequest	Not defined (Note 1)	– (Note 2)	Not defined	Not defined
callWaiting	PARAMETERS	Not defined	Not defined	Not defined
remoteUserAlerting	–	Not defined	Not defined	Not defined
cfbOverride	Not defined	–	Not defined	Not defined
NOTE 1 – "Not defined" means that this primitive is not defined. NOTE 2 – "–" means no parameters (manufacturer specific parameters may be present).				

10.4.2 Primitive definition

The callOfferRequest.Indication primitive is used to indicate the receipt of a **callOfferRequest** invoke APDU to the called user B.

The callWaiting.Request primitive is used to request the sending of a **callWaiting** invoke APDU to the calling user.

The remoteUserAlerting.Request primitive is used to request the sending of a **remoteUserAlerting** invoke APDU to the calling user.

The cfbOverride.Indication primitive is used to indicate the receipt of a **cfbOverride** invoke APDU (together with a **callOfferRequest)** to the called user B.

10.4.3 Parameter Definition

callWaiting.Indication parameters (see ITU-T H.450.6):

nbOfAddWaitingCalls: Indicates to the calling user the number of waiting calls at user B in addition to the call to which this APDU applies (e.g. if user A is the only call which camps on at user B, the value "0" is sent).

10.5 Call states

10.5.1 Call States at endpoint A

CO-Idle: No SS-CO signalling is in progress.

10.5.2 Call States at endpoint B

CO-Idle: No SS-CO signalling is in progress.

CO-Dest-Invoked: A call is camped-on (i.e. waiting on busy) at user B's endpoint.

10.6 Timers

Not applicable.

NOTE – All timers mentioned in previous clauses are a local implementation matter.

11 Operations in support of Call Offer supplementary service

The operations defined in Abstract Syntax Notation One (ASN.1) below shall apply.

(Do not translate or modify any part of the following ASN.1 definition)

```
Call-Offer-Operations
     { itu-t recommendation h 450 10 version1(0) call-offer-operations(0)}

DEFINITIONS AUTOMATIC TAGS  ::=

BEGIN
IMPORTS       OPERATION, ERROR FROM Remote-Operations-Information-Objects
                    {joint-iso-itu-t remote-operations(4)
                    informationObjects(5) version1(0)}
              MixedExtension FROM Call-Hold-Operations
                    {itu-t recommendation h 450 4 version1(0)
                    call-hold-operations(0)}
              callWaiting FROM Call-Waiting-Operations
                    {itu-t recommendation h 450 6 version1(0)
                    call-waiting-operations(0)};


H323CallOfferOperations  OPERATION ::=
     {callOfferRequest | callWaiting | remoteUserAlerting | cfbOverride }


callOfferRequest    OPERATION   ::=   -- sent from calling to called endpoint
     {
               ARGUMENT          CoReqOptArg OPTIONAL TRUE
               RETURN RESULT     FALSE
               ALWAYS RESPONDS   FALSE
               CODE              local: 34
     }


remoteUserAlerting  OPERATION   ::=   -- sent from called to calling endpoint
     {
               ARGUMENT          RUAlertOptArg OPTIONAL TRUE
               RETURN RESULT     FALSE
               ALWAYS RESPONDS   FALSE
               CODE              local: 115
     }


cfbOverride         OPERATION   ::=   -- sent from calling to called endpoint
     {
               ARGUMENT          CfbOvrOptArg OPTIONAL TRUE
               RETURN RESULT     FALSE
               ALWAYS RESPONDS   FALSE
               CODE              local: 49
     }


CoReqOptArg   ::=  SEQUENCE
     {
          extension     SEQUENCE SIZE (0..255) OF MixedExtension  OPTIONAL,
          ...
     }
```

```
RUAlertOptArg ::=  SEQUENCE
     {
          extension     SEQUENCE SIZE (0..255) OF MixedExtension  OPTIONAL,
          ...
     }


CfbOvrOptArg  ::=  SEQUENCE
     {
          extension     SEQUENCE SIZE (0..255) OF MixedExtension  OPTIONAL,
          ...
     }

END  -- of Call-Offer-Operations
```

12 Specification and Description Language (SDL) Diagrams for SS-CO

The procedures for Call Offer signalling entities are described in SDL form in Figures 8 and 9. The SDLs only show SS-CO specific information transported on an H.225.0 connection. H.245 procedures (e.g. terminal capability exchange, master/slave determination, opening and closing of logical channels, etc.) are not shown. The following abbreviations are used:

BC Basic Call

inv Invoke APDU

In case of a conflict between SDLs and the text within the previous clauses, the text shall take precedence.

Specific gatekeeper/proxy SDLs for the model where a gatekeeper/proxy acts on SS-CO on behalf of an endpoint are not provided.

The symbols used in the following SDLs, irrespective of the direction of input and output signals, are defined in Figure 7.

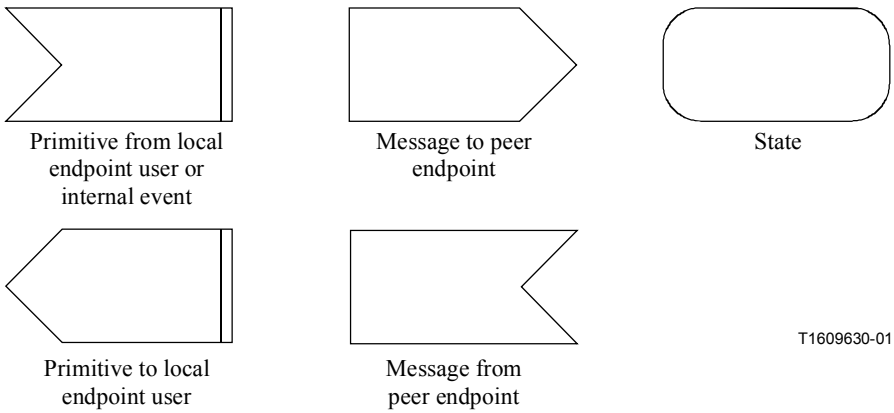


Figure 7/H.450.10 – SDL Symbols

12.1 Behaviour of user A's endpoint

Figure 8 shows the behaviour of user A's endpoint.

Input signals from the left and output signals to the left represent primitives:

- from or to the served user (user A);
- from or to basic call control; these primitives are indicated by "BC".

Input signals from the right and output signals to the right represent messages from or to the called peer SS-Control entity (i.e. in user B's endpoint) which carry SS-CO control information.

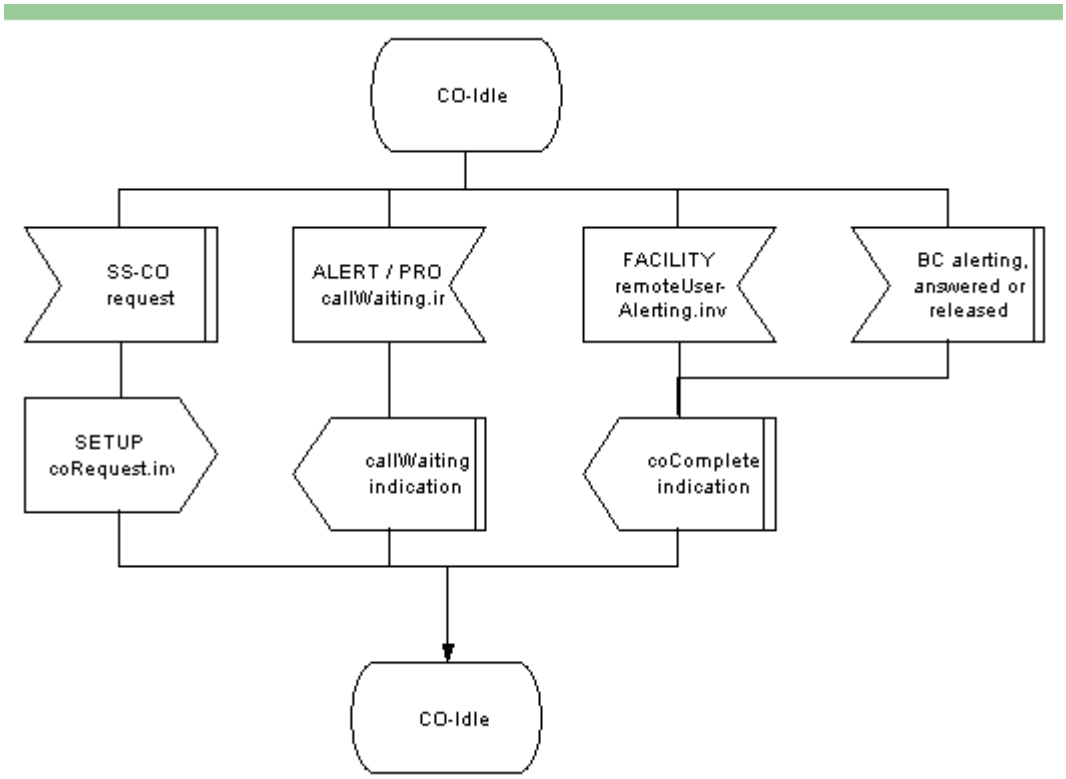


Figure 8/H.450.10 – Endpoint A SDL

12.2 Behaviour of user B's endpoint

Figure 9 shows the behaviour of user B's endpoint.

Input signals from the right and output signals to the right represent internal primitives, e.g. from or to basic call control (indicated by "BC").

Input signals from the left and output signals to the left represent messages from or to the calling peer SS-Control entity (i.e. in user A's endpoint) which carry SS-CO control information.

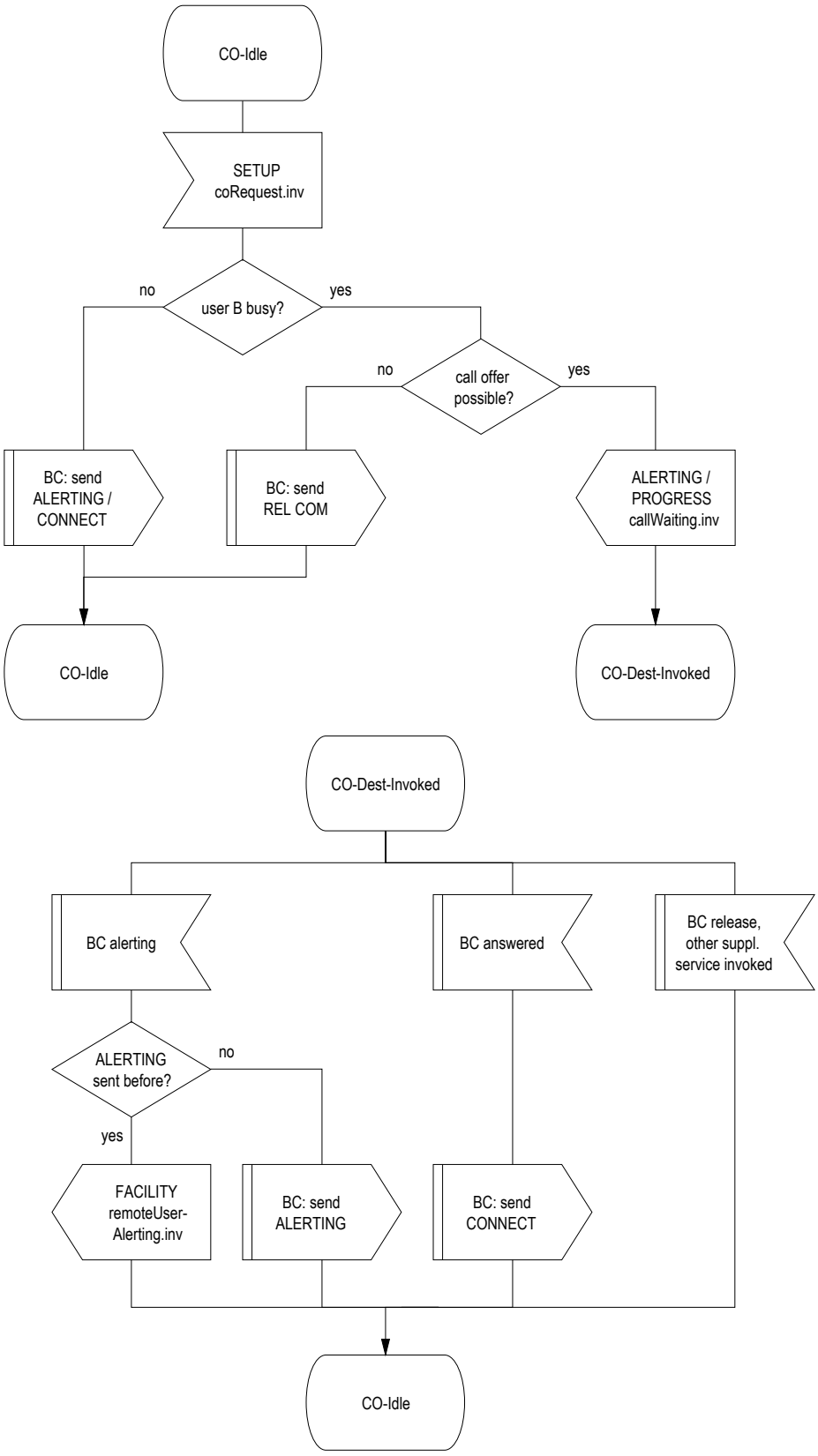


Figure 9/H.450.10 – Endpoint B SDL

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	**Audiovisual and multimedia systems**
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems

Geneva, 2001